




# AFRL-SA-WP-SR-2018-0001

# Application Development for Optimizing Patient Placement on Aeromedical Evacuation Flights: Proof-of-Concept

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**January 2018**

**January 2015 – December 2015**



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# REPORT DOCUMENTATION PAGE

*Form Approved*
*OMB No. 0704-0188*



| **1. REPORT DATE *(DD-MM-YYYY)*** | **2. REPORT TYPE** | **3. DATES COVERED *(From – To)*** |
|---|---|---|
| 12 Jan 2018 | Special Report | January 2015 – December 2015 |

**4. TITLE AND SUBTITLE**
Application Development for Optimizing Patient Placement on Aeromedical Evacuation Flights: Proof-of-Concept

**5a. CONTRACT NUMBER**

**5b. GRANT NUMBER**

**5c. PROGRAM ELEMENT NUMBER**

**6. AUTHOR(S)**
Brittany Fouts, Jennifer Serres, Ray Hill, Frank Ciarallo

**5d. PROJECT NUMBER**

**5e. TASK NUMBER**

**5f. WORK UNIT NUMBER**

**7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)**
USAF School of Aerospace Medicine
Aeromedical Research Department/FHE
2510 Fifth St., Bldg. 840
Wright-Patterson AFB, OH 45433-7913

**8. PERFORMING ORGANIZATION REPORT NUMBER**

AFRL-SA-WP-SR-2018-0001

**9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)**

**10. SPONSORING/MONITOR'S ACRONYM(S)**

**11. SPONSOR/MONITOR'S REPORT NUMBER(S)**

**12. DISTRIBUTION / AVAILABILITY STATEMENT**

DISTRIBUTION STATEMENT A. Approved for public release. Distribution is unlimited.

**13. SUPPLEMENTARY NOTES**
Cleared, 88PA, Case # 2018-0168, 16 Jan 2018.

**14. ABSTRACT**

A critical, yet challenging step in mission planning for aeromedical evacuation (AE) is patient positioning on the airframe. Prior to each flight, an AE provider designates seat and litter assignments for patients, flight crew, AE crew, non-medical attendees, and all additional passengers. Patient destination, type (ambulatory or litter), injury/illness, acuity, and equipment requirements all influence the development of the patient positioning plan. An interactive tool to aid AE crewmembers in the creation, modification, and distribution of these plans would streamline the plan development process. Thus, as a proof-of-concept, the study team conducted a multi-phased effort to develop a tool to optimize patient placement for AE. The first phase established current patient placement practices for multiple AE airframes through structured subject matter expert (SME) interviews and the review of literature and regulatory documents. SMEs provided valuable insight into regulatory constraints, guidelines, and common practices specific to the AE environment. During phase 2, the study team developed a graphical prototype in Microsoft Excel to storyboard the logic requirements of the interactive tool. In phase 3, information garnered in the first two phases facilitated the development of a proof-of-concept iOS mobile application to assist AE personnel in the development of patient positioning plans. As a final step, SMEs reviewed the tool and provided recommendations for modifications. These recommendations highlighted the need to conduct usability testing in a flight environment to compare the resulting efficiency and accuracy of the tool to methods currently employed. Through a collaboration with the Defense Health Agency National Center for Telehealth and Technology, the proof-of-concept iOS mobile application developed in phase 3 has been modified to include space for the input of patient information, a list of frequently used equipment packages, equipment weights, and electronic requirements of equipment. Future work could also include the assessment and possible integration of clinical decision support algorithms based on AE guidelines, standards of practice, and stresses of flight research to further enhance the ability of the AE providers to create responsive patient positioning plans for this dynamic environment.

**15. SUBJECT TERMS**
Aeromedical evacuation, patient placement, mobile apps

| **16. SECURITY CLASSIFICATION OF:** | | | **17. LIMITATION OF ABSTRACT** | **18. NUMBER OF PAGES** | **19a. NAME OF RESPONSIBLE PERSON** |
|---|---|---|---|---|---|
| **a. REPORT** | **b. ABSTRACT** | **c. THIS PAGE** | | | Brittany Fouts |
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# ACKNOWLEDGMENTS

The research team would like to thank the programming team at the Department of Operational Analysis at the Air Force Institute of Technology at Wright-Patterson Air Force Base, Mr. Christopher Samuelson, Mr. Christopher Weir, and Mr. Peter Heinig, for their technical expertise, assistance, and application development efforts. The research team would also like to thank Maj Jeremy Hicks, Lt Col Karey Dufour, and Maj Stephen Urban for their subject matter expertise and insight into current aeromedical evacuation operations. Without their insight and continued feedback, the development of this tool would not have been possible.

This study was supported with Defense Health Program funds through the 711th Human Performance Wing.

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# 1.0 SUMMARY

A critical, yet challenging step in mission planning for aeromedical evacuation (AE) is patient positioning on the airframe. Prior to each flight, an AE provider designates seat and litter assignments for patients, flight crew, AE crew, non-medical attendees, and all additional passengers. Patient destination, type (ambulatory or litter), injury/illness, acuity, and equipment requirements all influence the development of the patient positioning plan. An interactive tool to aid AE crewmembers in the creation, modification, and distribution of these plans would streamline the plan development process. Thus, as a proof-of-concept (POC), the study team conducted a multi-phased effort to develop a tool to optimize patient placement for AE. The first phase established current patient placement practices for multiple AE airframes through structured subject matter expert (SME) interviews and the review of literature and regulatory documents. SMEs provided valuable insight into regulatory constraints, guidelines, and common practices specific to the AE environment. During phase 2, the study team developed a graphical prototype in Microsoft Excel to storyboard the logic requirements of the interactive tool. In phase 3, information garnered in the first two phases facilitated the development of a POC iOS mobile application to assist AE personnel in the development of patient positioning plans. As a final step, SMEs reviewed the tool and provided recommendations for modifications. These recommendations highlighted the need to conduct usability testing in a flight environment to compare the resulting efficiency and accuracy of the tool to methods currently employed. Through a collaboration with the Defense Health Agency National Center for Telehealth and Technology, the POC iOS mobile application developed in phase 3 has been modified to include space for the input of patient information, a list of frequently used equipment packages, equipment weights, and electronic requirements of equipment. Future work could also include the assessment and possible integration of clinical decision support algorithms based on AE guidelines, standards of practice, and stresses of flight research to further enhance the ability of the AE providers to create responsive patient positioning plans for this dynamic environment

# 2.0 BACKGROUND

En route care (ERC) is the movement of patients from point of injury to definitive care. During ERC, En Route Patient Staging System, aeromedical evacuation (AE), and critical care air transport personnel all play a role in the preparation, loading, and care of their patients to ensure a successful transport. Extensive planning is needed to ensure missions are conducted efficiently and successfully. An essential component of mission planning is patient and equipment positioning on airframes prior to transport [1]. Several factors influence the placement of patients and equipment on airframes including, but not limited to, patient type (litter or ambulatory) [2], patient injury, patient illness, varying patient acuity, starting and ending location of mission, and equipment requirements [3-5]. Several regulations and Air Force instructions (AFIs) exist to guide the placement of patients and equipment on an airframe including AFI 11-2AEV3 CL-1 [6] and AFI 11-2AEV3Addenda-A [7]. However, due to the dynamic environment resulting from equipment limitations, changing patient acuity, and last-minute patient positioning changes, the task to develop a patient positioning plan is an arduous process and remains a challenge.

Prior to each mission, the medical crew director or aeromedical evacuation crewmember (AECM) creates the patient positioning plan. To create this plan, the medical crew director or AECM must take into consideration the aforementioned factors. The plan designates a location for each patient, flight crewmember, AECM, non-medical attendees, and any additional passengers [3-5]. In current operations, the patient positioning plan is developed manually using pen and paper or in some cases a spreadsheet format [3-5,8]. Once completed, the positioning plan is distributed by hand to the rest of the AE crew and is scanned and emailed to the contingency aeromedical staging facility and the Patient Movement Requirements Center. If patients and equipment move during flight, the positioning plans are not typically updated. In addition, the plans are often discarded after each flight, leaving no documentation of patient or equipment placement throughout the flight [8]. The plan development process may take several hours and may be repeated multiple times depending on the availability and accuracy of information [3,4], hindering the ability of AECMs to complete other tasks.

An interactive tool to aid AECMs in the creation of patient positioning plans could streamline the development process, enable AECMs to have additional time to assist with other aspects of mission planning, and allow electronic documentation and transmission of positioning plans to vital personnel throughout the continuum of ERC [3-5,8]. In addition, the development of clinical decision support algorithms to ensure patients and equipment are placed in optimal positions based on patient conditions may improve patient safety [3-5].

This report describes the 1-year, multi-phased effort to develop a proof-of-concept (POC) iOS mobile application (app) to assist AE personnel in the development of patient positioning plans.

# 3.0 METHODS

This study was a multi-disciplinary, collaborative effort between researchers at the U.S. Air Force School of Aerospace Medicine, the Air Force Institute of Technology, and Wright State University. The main goal of this study was to develop and demonstrate a computer-based, interactive tool to assist AE personnel in the creation of patient positioning plans. The development and integration of an electronic, assistive app will streamline the mission planning process for AE crews and may facilitate improved patient, crew, and passenger safety and patient outcomes. This study included three phases: knowledge elicitation, establishment of rule-based, logic requirements, and the development of the POC iOS mobile app.

## 3.1 Knowledge Elicitation

During the knowledge elicitation phase, the main goals were to 1) identify regulatory constraints regarding patient/passenger placement within AE airframes, 2) identify standard aircraft configurations and guidelines for AE airframes, and 3) identify rules-of-thumb used to develop patient positioning plans [4,5].

To meet the goals of the first phase, the research team conducted interviews with multiple subject matter experts (SMEs) who had several years of AE mission planning experience to determine how patient positioning plans are created today. The SMEs advised the study team on pertinent documents including AFIs and regulatory documents, and a literature review was conducted of CINAHL [Cumulative Index to Nursing and Allied Health Literature], Defense Technical Information Center, and MEDLINE on articles pertaining to patient placement within

military airframes [4,5]. The knowledge garnered in this phase established the requirements for the patient positioning app.

### 3.2 Graphical Prototype

During the second phase, a graphical prototype of the app was developed using Microsoft Excel. This prototype enabled the study team to establish the logic needed for a mobile app prior to programming for iOS platforms. The study team selected Microsoft Excel because it enabled the developers to easily create and tailor multiple screens in response to SME feedback. The information from the review of the literature, AFIs, and SME interviews guided the requirements for a mobile iOS app. The necessary number of screens and clicks and the information required for an individual to create a patient positioning plan were identified throughout this phase. SMEs provided multiple iterations of review for the graphical prototype. This process provided the study team with insight on the functionality and applicability of the design.

### 3.3 Mobile App Development

During phase three, a POC mobile app to assist AE personnel in the development of patient positioning plans was developed and demonstrated. The graphical storyboard from phase 2 guided the development of the mobile iOS app in this phase. The programming team located at the Air Force Institute of Technology utilized Apple Developer Xcode for the app development. As with phase 2, SMEs continually reviewed and provided feedback on the iOS mobile app.

## 4.0 RESULTS

A POC iOS mobile app was developed to assist AE providers in the creation of patient positioning plans and was demonstrated on an Apple iPad. The application allowed users to select from three commonly used AE airframes for patient transport (C-130, C-17, and KC-135). Currently, input data are manually loaded and modified, and output plans are not maintained for future use [4,8].

### 4.1 Knowledge Elicitation

During phase 1, the SMEs identified several key terms, patient placement considerations, regulatory documents, and commonly used practices necessary for developing patient positioning plans on the C-17, C-130H, C-130J, and KC-135 airframes. The following factors related to airframe, infection control, and patient specifics were identified as being essential to the patient positioning plans: location of emergency exits, location of emergency equipment, location of access to the front-end crew, airflow throughout airframe, mechanic's log documenting broken equipment, cargo, infectious agent/type, crew compliment, number/type of attendants, equipment litters, and get-down litters. AFI 48-307, En Route Care and Aeromedical Evacuation Medical Operations [9], and AFI 11-2AE Volume 3, Addenda-A, Aeromedical Evacuation Operations Configuration/Mission Planning [7], were identified as the key resources needed for the development of a patient positioning app [4,5,8]. A list of current rules for patient positioning on AE airframes was developed and provided the foundation for future development

of clinical decision support algorithms. Table 1 contains the current patient positioning practices and their associated AFIs. In current operations, AE providers use a paper or spreadsheet template and manually create the patient positioning plans [4,5,8]. Figure 1 shows this template for a C-17.

**Table 1. Current Patient Positioning Practices**

| Recommended Practice | AFI |
|---|---|
| Place cargo behind litter patients if possible | 11-2AEV3 |
| Place intravenous therapy patients in middle or low tier when possible | 48-307 |
| Critical care patients should have entire litter if possible | 11-2AEV3 |
| Psychiatric patients should be placed in the lowest litter space, away from flight deck and exits | 48-307 |
| Mobility impaired ambulatory patients are not to be placed near emergency exits | 48-307 |
| Ambulatory with eye injuries or blindness should be placed away from exits and near able-bodied individual | 48-307 |
| Chest tube patients should be placed in middle tier | 48-307 |

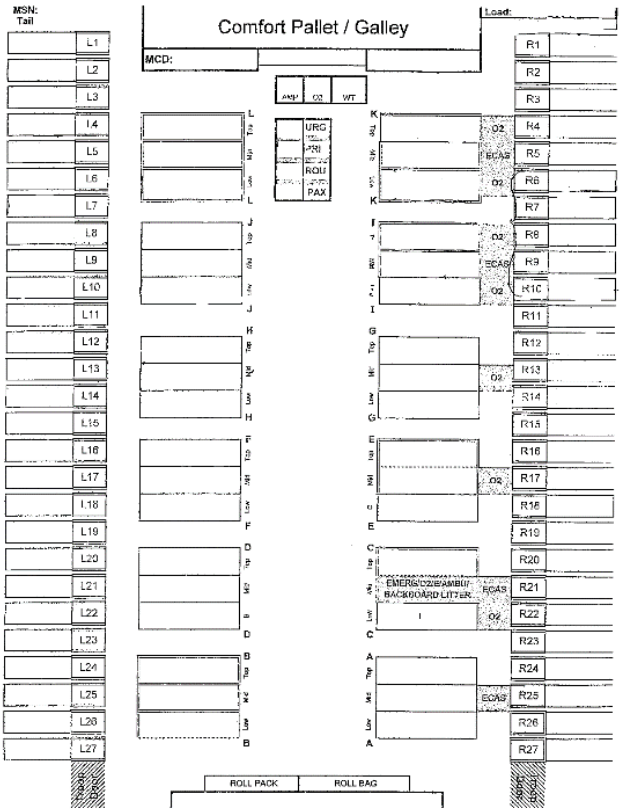



**Figure 1. Patient positioning plan template.**

## 4.2 Graphical Prototype

The information obtained in phase 1 guided the development of a graphical prototype in phase 2. The patient positioning plan templates helped the study team identify the number of litter locations, jump seats, mandatory locations for attendants, additional passengers, aircrew, and equipment for each AE platform (C-130H, C-130J, C-17, and KC-135). The platform of

interest for the development of the graphical prototype was the C-17, as it is a commonly used airframe for AE operations. Figure 2 shows the graphical prototype developed for the C-17 [3,4,8].

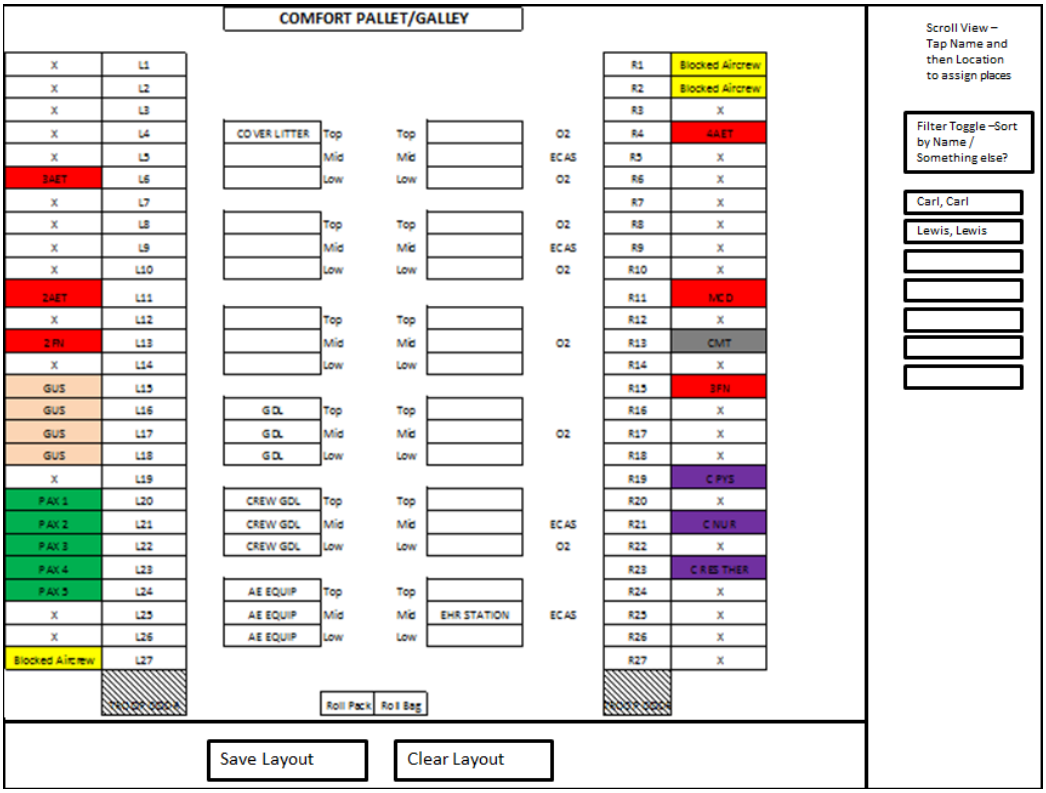



**Figure 2. Graphical prototype.**

The graphical prototype was used to create a storyboard of the envisioned app to include a splash screen [3], templates for the other airframes (C-130, C-17, and KC-135), list of default patients, and list of default equipment. A flowchart depicting each step in the graphical prototype is included in Appendix A [3-5,8]. SMEs evaluated each step and provided recommendations to improve the flow and capture missing information, such as add medical attendants and non-medical attendants as pre-loaded passenger selections, add get-down litter and get-up seat as pre-loaded location selections, provide options to input patient and equipment weights, automatically calculate total patient and equipment weights, and add locations of oxygen throughout the airframe. Initially, the graphical prototype prompted the user to select the airframe of interest, after which the respective airframe template page appeared. The user could then drag and drop patients from the pre-loaded list to the desired location. The user is also able to add additional patient information using the text box such as name, age, weight, classification, requirements for supplemental oxygen if needed, dietary restrictions, and equipment requirements. This graphical prototype served as the foundational logic for the iOS mobile app developed in phase 3.

### 4.3 Mobile App Development

As a POC, the team developed an interactive tool in the form of an iOS mobile app in phase 3. AE providers currently carry an iPad, known as an electronic flight bag (EFB), which contains copies of pertinent AFIs and other regulatory information. Therefore, iOS was the desired format for the patient positioning plan mobile app.

The programming team used Xcode to develop the app based on the final output from phase 2 [3,8]. In phase 3, features were added to enable the user to add additional patients and equipment, and a save feature was also added to enable users to save templates for future review and use. The user initially selects an airframe (C-130, C-17, or KC-135), places patients accordingly, edits and adds patient information, rearranges patients as needed, adds additional equipment, and then saves the arrangement for future use. These interfaces are shown in Appendix B. The current version of the application is a POC and assumes that the input data for patients and equipment are pre-loaded [4,8]. The current version does not allow for the generation of output files, and the application has no inherent rule sets to make suggestions or corrections to the locations of patients based on their condition and/or illness [3,4,8].

The POC includes interactive, basic functions as described in the following nine use cases:

- Use case 1: A patient can be added to the *patient layout view* [3] by selecting from the *patient list view* [3,4,8] and choosing the spot in which to place them. During this use case, it is assumed no patient is selected in the *patient layout view* [3]. If a patient is already selected, the user can simply deselect the patient through a single tap.
- Use case 2: A patient can be removed from the *patient layout view* [3] by selecting the patient and pressing the “remove” button in the bottom left corner.
- Use case 3: Equipment can be added to the *patient layout view* [3] by selecting equipment from the *equipment view* [3,4,8] and placing the equipment in the embedded *patient layout view* [3].
- Use case 4: Equipment can be removed from the *patient layout view* [3] by selecting the equipment and pressing the “remove” button in the bottom left corner.
- Use case 5: Patients and equipment can be rearranged on the *patient layout view* [3] by selecting which patient/equipment to move and then choosing the destination (patient/equipment swapping is done automatically).
- Use case 6: The *patient layout view* [3] shows minimal patient information to maintain a simple interface. However, more information can be displayed about a particular patient by double tapping on the patient.
- Use case 7: Equipment arrangements can be saved as a template for future use by pressing the “save template” button in the *equipment view* [3,4,8].
- Use case 8: Equipment arrangements can be loaded from a previously saved template by tapping the “load template” button in the *equipment view* [3,4,8].
- Use case 9: Patient information can be edited on the *patient list view* [3,4,8] by selecting the patient whose information needs editing. A user can press the “Edit patient info” button then use the text boxes and keyboard to make changes as needed. When finished editing, the user can press “Finish editing” to commit changes.

Within the application, there are four basic views used to create patient positioning plans as shown in Appendix B. The first view is the *plane options view*, which shows the available planes [3]. Each plane has a different number of seats and bunk heights depending on the aircraft configurations. The second view is the *patient layout view* [3], which displays the orientation and numbers of the litters and seats within the aircraft and the names of patients and equipment whenever new patients and pieces of equipment are added. The third view is the *patient information view*, which includes patients who are going to be on the flight [4,8]. If a user selects a patient, it will show additional information in larger format on the right side of the screen. The selected patient's information can be edited as needed as described in use case 9. The fourth view is the *equipment information view* [4,8]. The equipment view consists of two areas. The top area lists all equipment that is available to be loaded. The lower area is an embedded plane layout view for ease of adding equipment to the plane. Finally, there are two buttons that allow saving and loading an equipment template [4,8].

## 5.0 CONCLUSION

To the authors' knowledge, this is the first study examining a material solution for patient positioning plans. In current operations, AE providers develop patient positioning plans manually, using a paper or computer-based template that contains blank spaces for litters and jump seats. The AECM creating the patient positioning plan may have to write, erase, and rewrite patient names multiple times before the patient positioning plan is complete [3-5,8,10,11]. The current patient positioning plan does not include information about specific equipment, and there is no way to ensure the plan is updated throughout flight, as individuals may move to new seats throughout the airframe. The development of an electronic, user-friendly, mobile tool that is widely available to military personnel on electronic flight bags, accessed at a moment's notice, and updated throughout flight to reflect actual patient and equipment placement would streamline current operations.

Further design optimization is needed to include human factors testing of the application [4,10,11]. To date, several SMEs with experience developing patient positioning plans have reviewed the application; however, no formal system usability testing has been completed. Future work is needed to compare the time it takes for an individual to create a patient positioning plan with the interactive tool developed as part of this study to the current techniques. Currently, the app contains the default templates for the C-130, C-17, and KC-135 airframes, but non-standard layouts as well as other airframes such as rotary-wing platforms are needed [4,10,11].

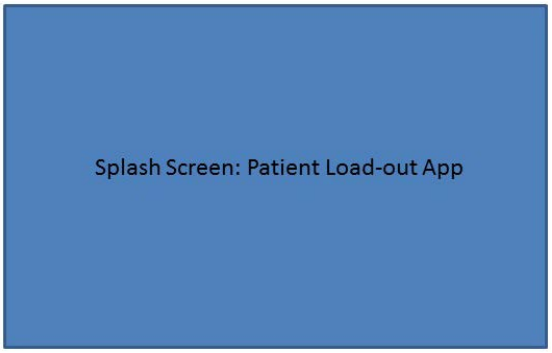
Through a collaboration with the National Center for Telehealth and Technology, which is a component of the Healthcare Operations Directorate under the Defense Health Agency, the initial POC mobile patient positioning tool has been modified to include an updated color scheme, an option to select whether the patient requires supplemental oxygen, additional equipment packages, equipment weights, and tracking for the weights of patients and equipment throughout the airframe. While the tool does not contain specific rule sets for where patients or equipment should be placed, future iterations could incorporate underlying rules to suggest optimal patient placement and flag placements that violate a given rule. Clinical decision support and algorithm development to provide placement recommendations to the user based on patient condition are also needed to enhance the functionality and operational benefit of the app

[4,10,11]. By optimizing patient placement practices, patient safety and pain management in ERC will likely improve [3,4,10,11].

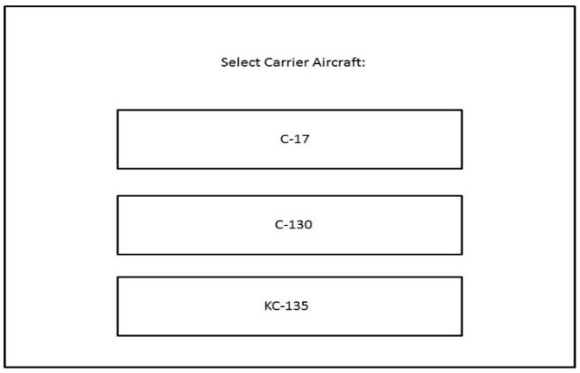
## 6.0 REFERENCES


1. Ritchie EC, editor. Combat and operational behavioral health. Falls Church (VA): Office of the Surgeon General, U.S. Army; 2011.
2. Guerdan BR. United States Air Force aeromedical evacuation – a critical disaster response resource. Am J Clin Med. 2011; 8(3):153-156.
3. Fouts B. Description of medical technologies for the aeromedical evacuation environment. Presentation at the Airlift Tanker Association and Air Mobility Command Symposium; 2015 Oct 28-Nov 1; Orlando, FL.
4. Fouts B, Serres J, Hill R, Ciarallo F. Application development for optimizing patient placement in the en route care environment [Abstract]. Aerosp Med Hum Perform. 2016; 87(3):198.
5. Hicks J, Serres J, Fouts B, Hill R, Ciarallo F. Application development for optimizing patient placement on the C-17 airframe: summary of current practices. Presentation at the Health and Human Performance Research Summit; 2015 Apr 28-30; Dayton, OH.
6. U.S. Air Force. Aeromedical evacuation crew (AEC) checklist. Washington (DC): Department of the Air Force; 2017. Air Force Instruction 11-2AE Volume 3, CL-1. [Accessed 1 Oct 2017]. Available from http://static.e-publishing.af.mil/production/1/af_a3/publication/afi11-2aev3cl-1/afi11-2aev3_cl-1.pdf.
7. U.S. Air Force. Aeromedical evacuation operations configuration/mission planning. Washington (DC): Department of the Air Force; 2011. Air Force Instruction 11-2AE Volume 3, Addenda-A. [Accessed 1 Oct 2017]. Available from http://static.e-publishing.af.mil/production/1/af_a3_5/publication/afi11-2aev3addenda-a/afi11-2aev3addenda-a.pdf.
8. Fouts B, Wilson M, Hill R, Ciarallo F. Highly efficient loading program for en route care (HELPER app). Presentation at the Airlift Tanker Association and Air Mobility Command Symposium; 2016 Oct 27-30; Nashville, TN.
9. U.S. Air Force. En route care and aeromedical evacuation medical operations. Washington (DC): Department of the Air Force; 2017. Air Force Instruction 48-307, Volume 1. [Accessed 1 Oct 2017]. Available from http://static.e-publishing.af.mil/production/1/af_sg/publication/afi48-307v1/afi48-307v1.pdf.
10. Losekamp T, Roseboro J. Latest patient care training technologies for the en route care environment: presentation of 711 HPW technologies. Presentation at the Airlift Tanker Association and Air Mobility Command Symposium; 2017 Oct 26-29; Orlando, FL.
11. Wilson M, Fouts B, Burch D. Development of mobile health apps for military en route care: a collaboration between United States Air Force and Defense Health Agency. Presentation at the Military Health System Research Symposium; 2017 Aug 27-30; Orlando, FL.

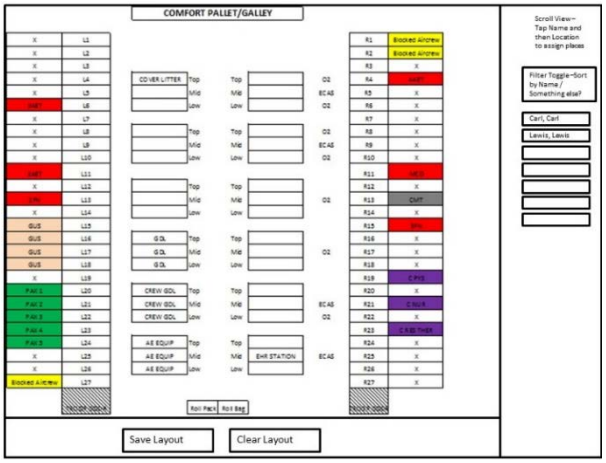
# APPENDIX A
# Flowchart for Graphical Prototype



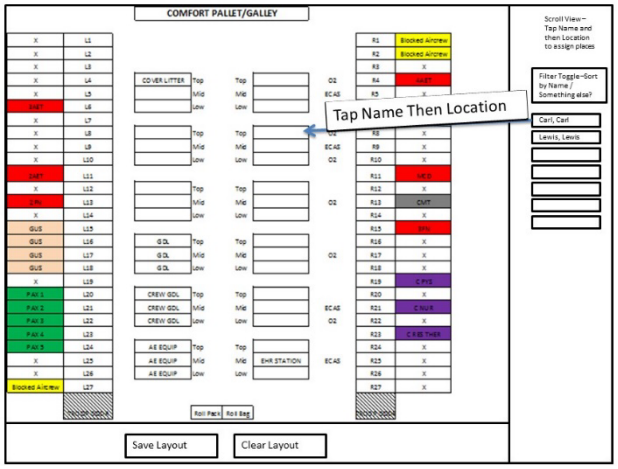

Splash screen.



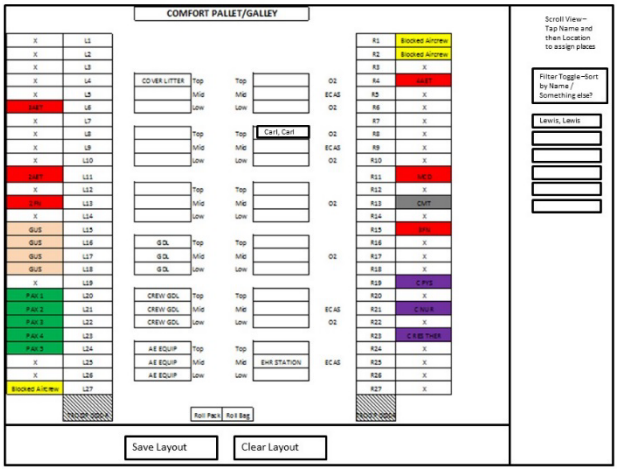

Aircraft selection screen.



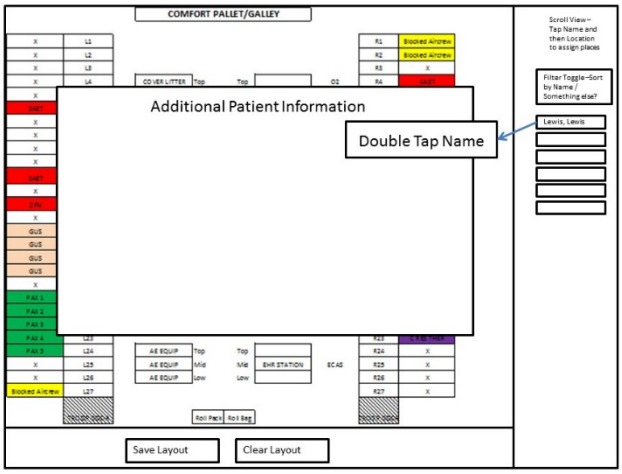

Aircraft template screen.




Demonstration of patient placement.

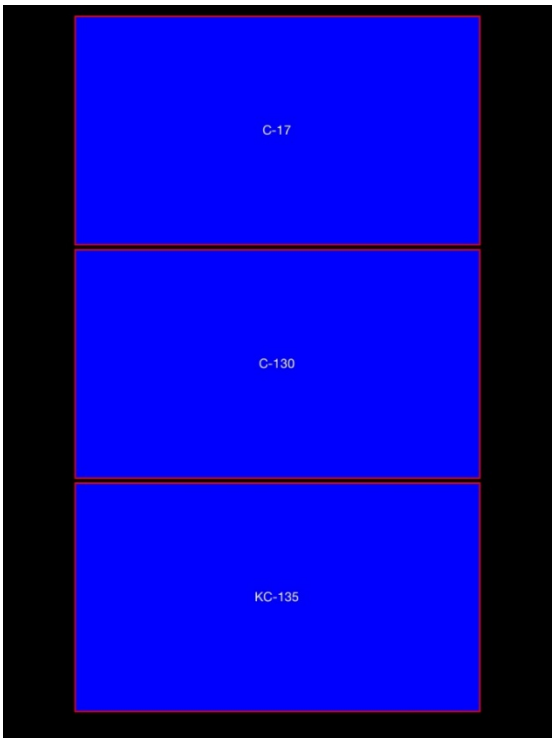



Example of litter patient placement.

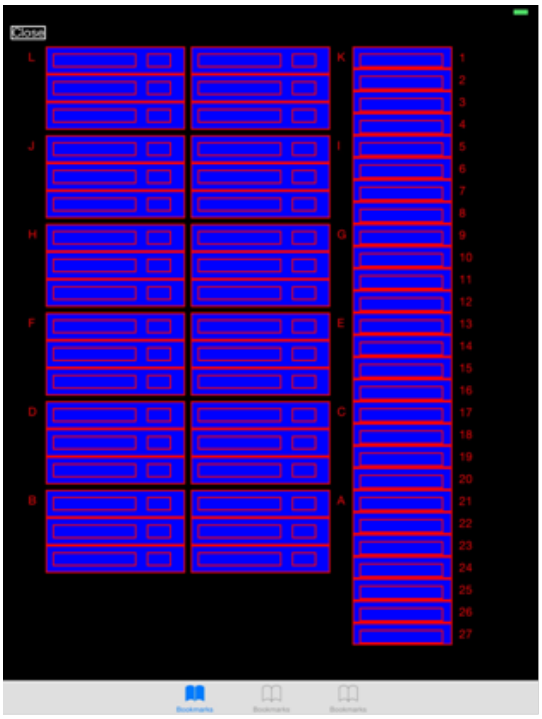



Additional patient information page.

# APPENDIX B
# Proof-of-Concept App Screens

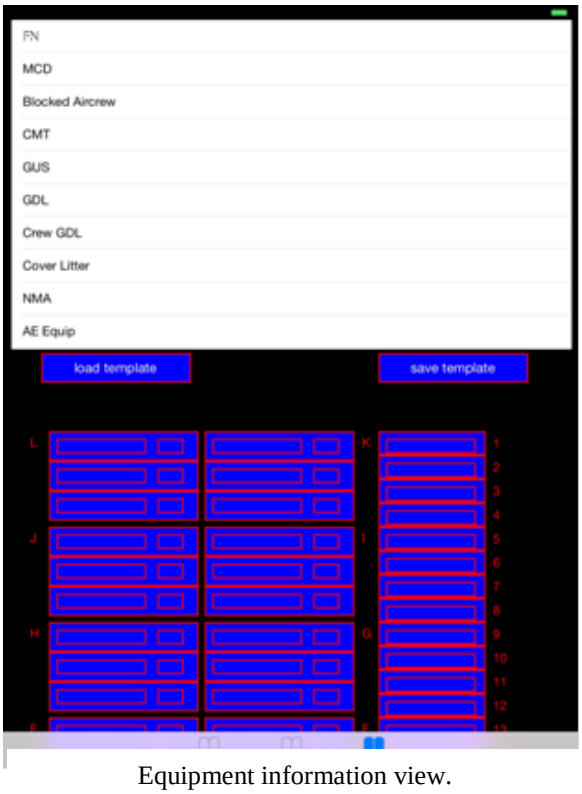



Plane options view.




Patient layout view.


Patient information view.




Equipment information view.

# LIST OF ABBREVIATIONS AND ACRONYMNS

| | |
|---|---|
| **AE** | aeromedical evacuation |
| **AECM** | aeromedical evacuation crewmember |
| **AFI** | Air Force instruction |
| **app** | application |
| **ERC** | en route care |
| **POC** | proof-of-concept |
| **SME** | subject matter expert |